

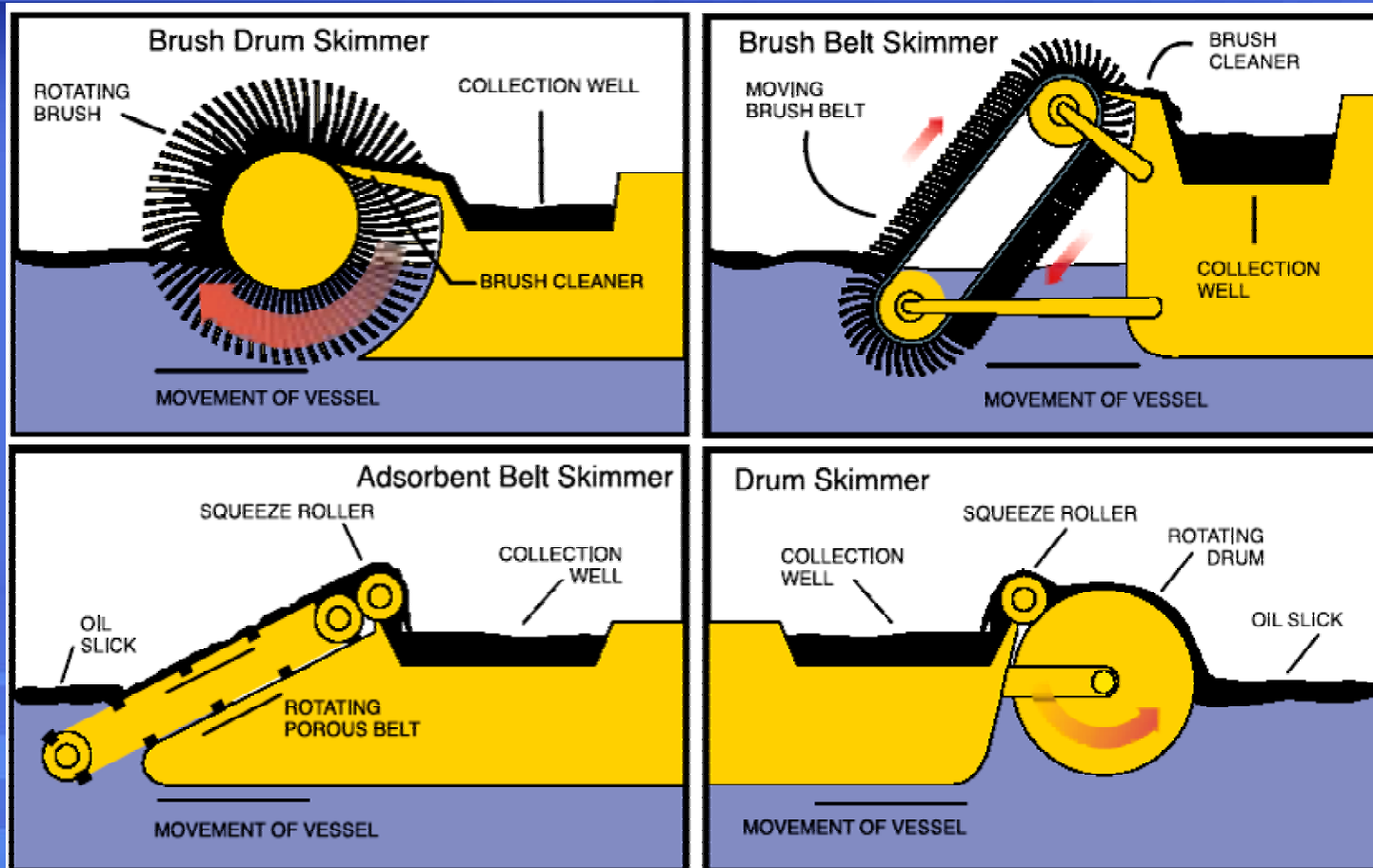
US EPA ARCHIVE DOCUMENT

# Improved recovery of oil spills from water surfaces using tailored surfaces in oleophilic skimmers

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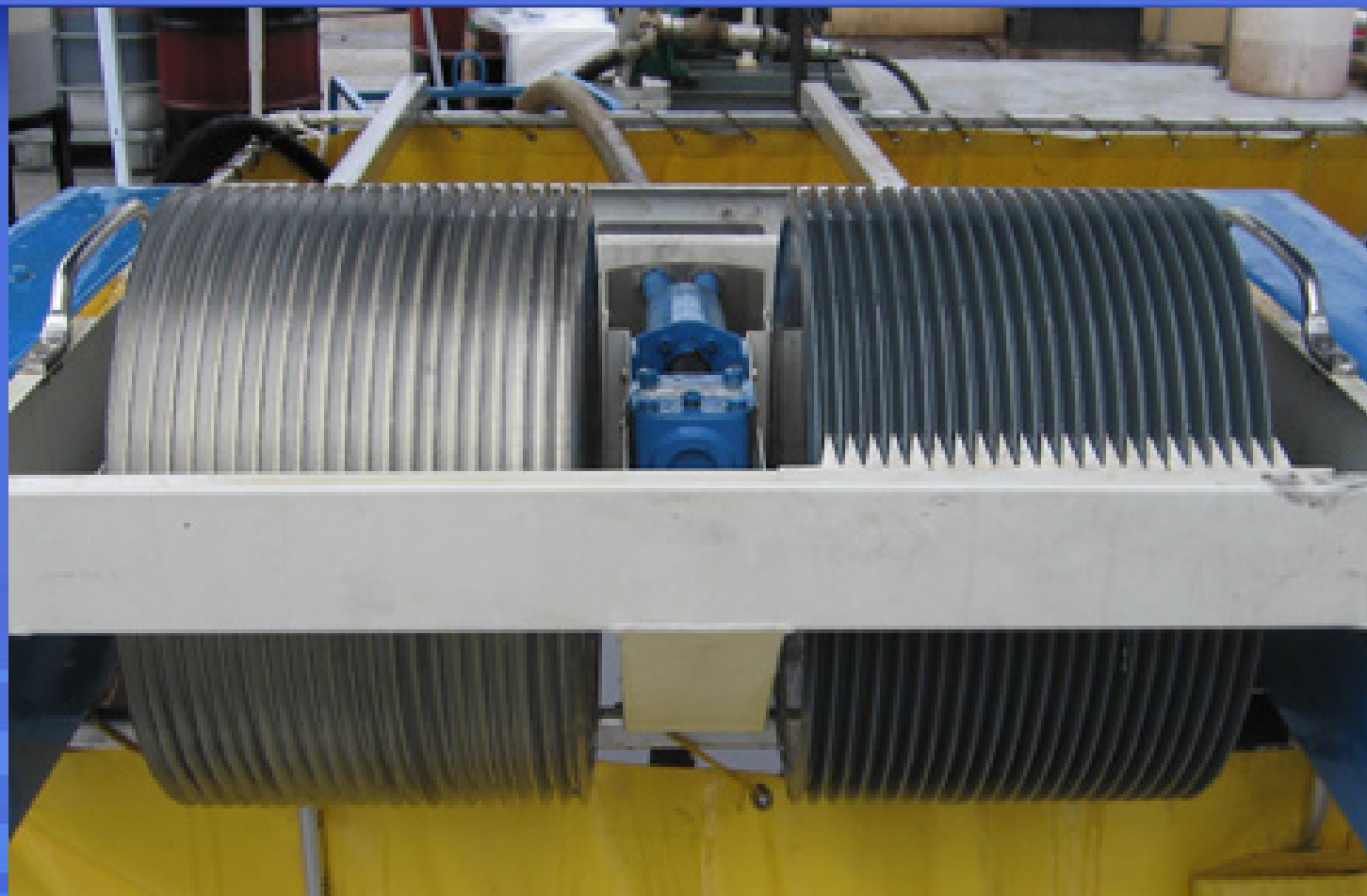
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# Mechanical recovery



Fingas, 2002

# *Grooved drums*



U.S. Provisional Patent Application (serial no. 60/673,043) by UCSB.

# *Objectives*

The primary objectives of this research were:

- to perform a full-scale test of novel oleophilic drum recovery surfaces tailored for oil spill recovery;
- to determine the relation between the operational parameters and oil recovery efficiency.

# *Test variables*

- ④ Ambient temperature  
≈10°C and ≈25°C
- ④ Oil type  
Diesel, Endicott, and HydroCal 300
- ④ Oil film thickness  
10 mm, 25 mm and 50 mm
- ④ Drum rotation speed  
30, 40 and 65 rpm
- ④ Material of the drum surface  
Aluminum, Polyethylene, Polypropylene,  
Neoprene, Hypalon
- ④ Drum surface pattern  
smooth and grooved

# *Oil properties*

Oil Type \ Temperature	Density (g/ml)		Viscosity (cP)		Asphaltenes %
	15°C	25°C	15°C	25°C	
<b>Diesel</b>	0.833	0.823	6	2	0
<b>Endicott</b>	0.923	0.907	92	50	4
<b>HydroCal 300</b>	0.921	0.905	340	162	0

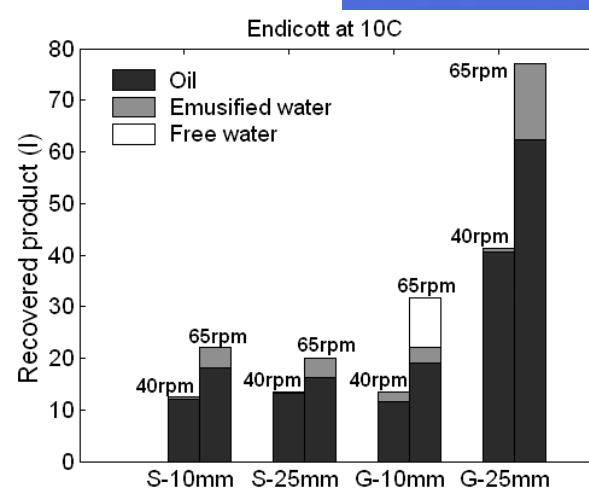
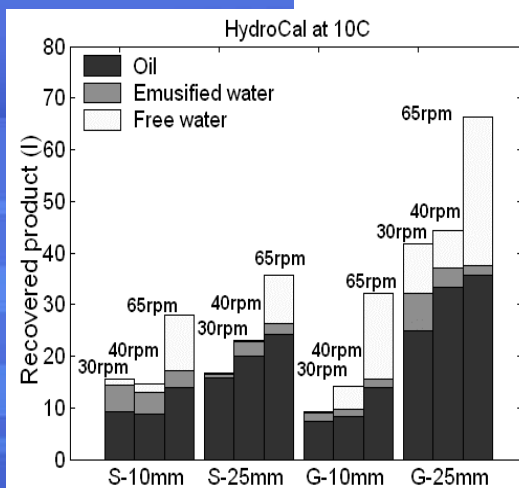
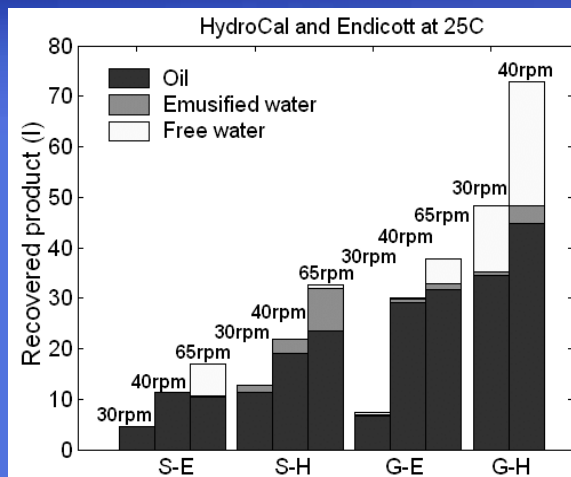


# *Ohmsett facility*





# Test results



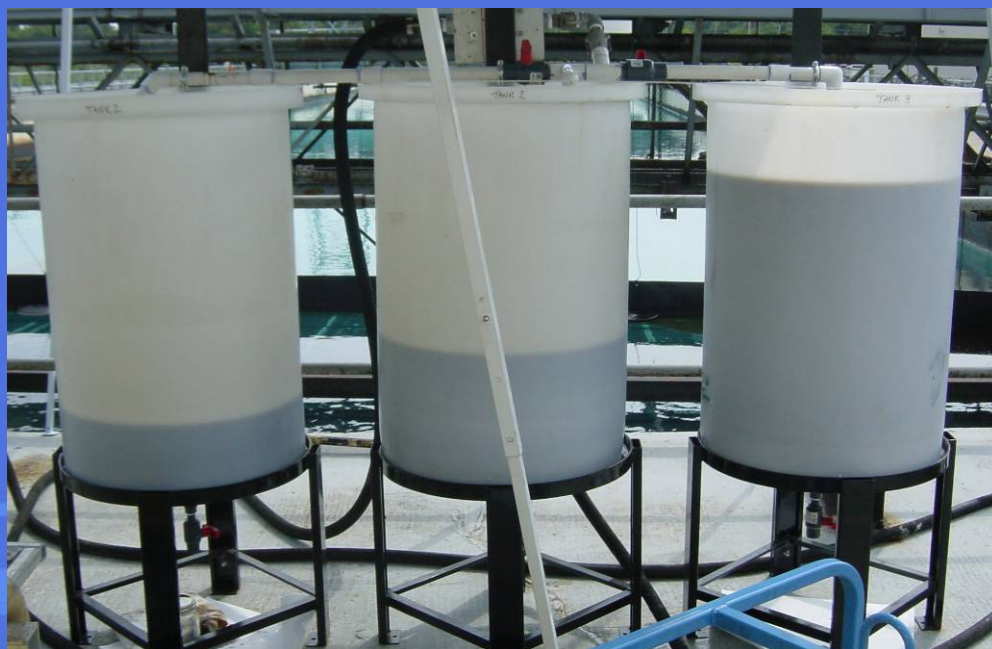
## *Test results: HydroCal recovery*

### Smooth drum

30 rpm

40 rpm

65 rpm

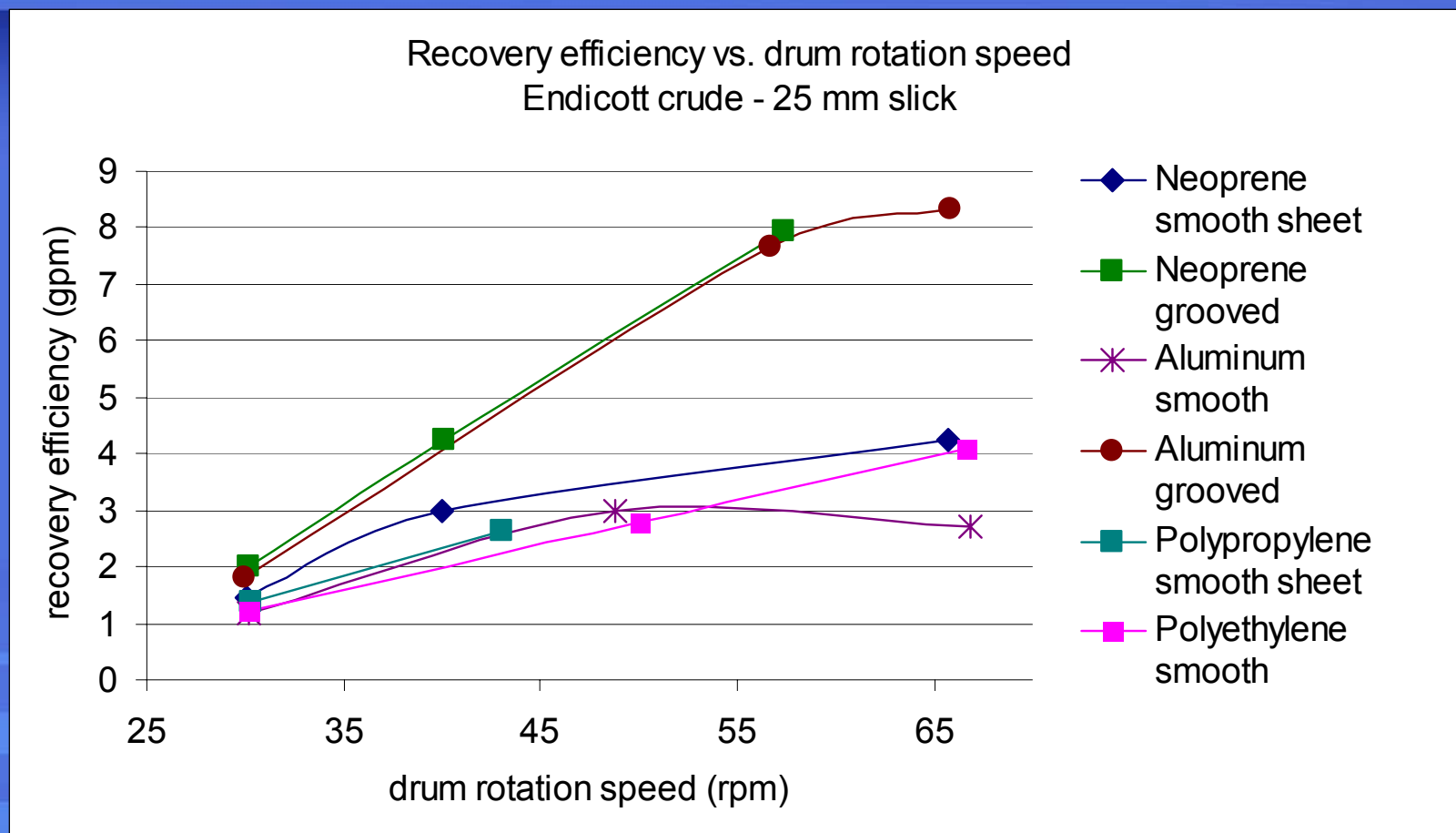


### Grooved drum

65 rpm

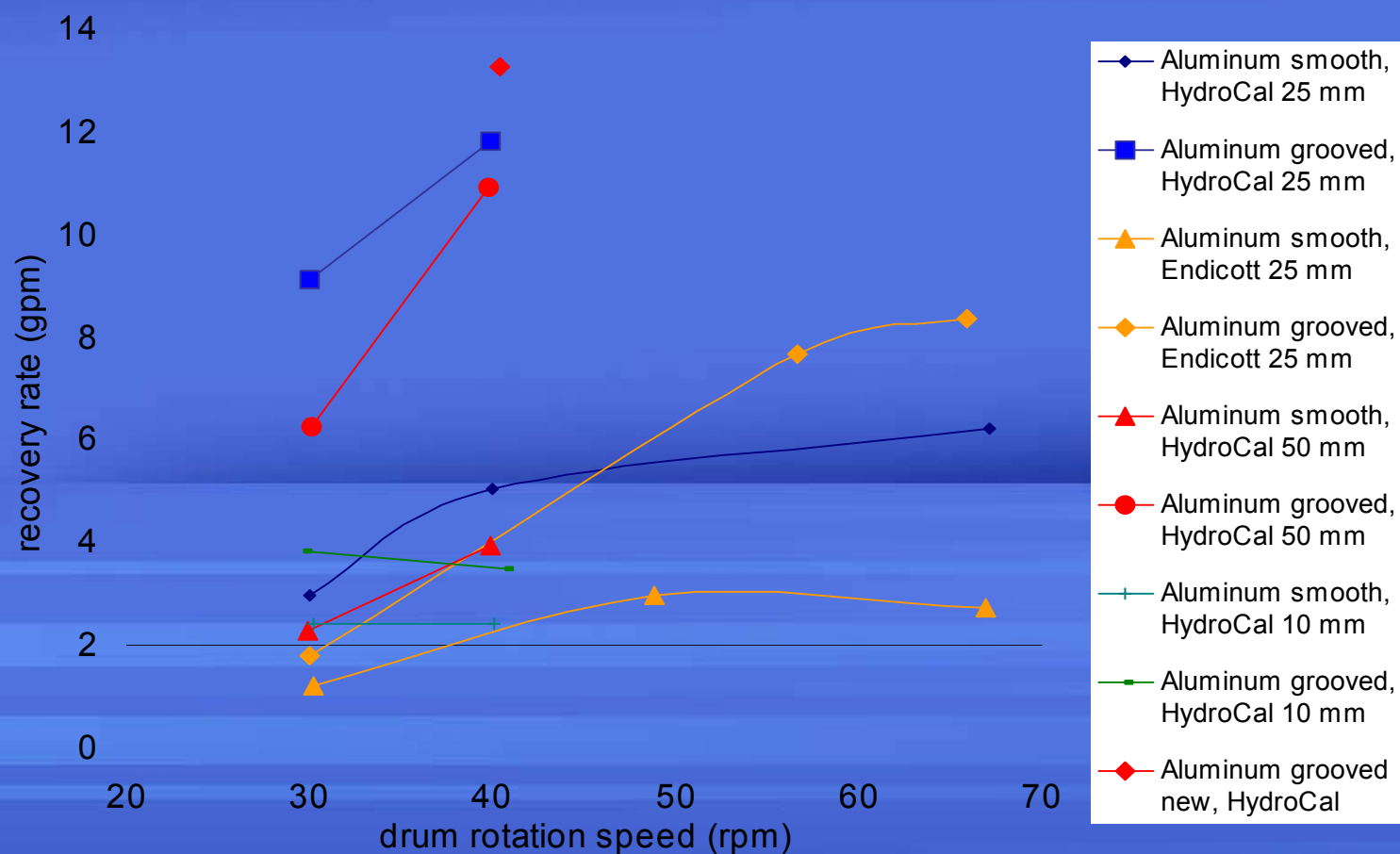


## Test results: drum material and pattern

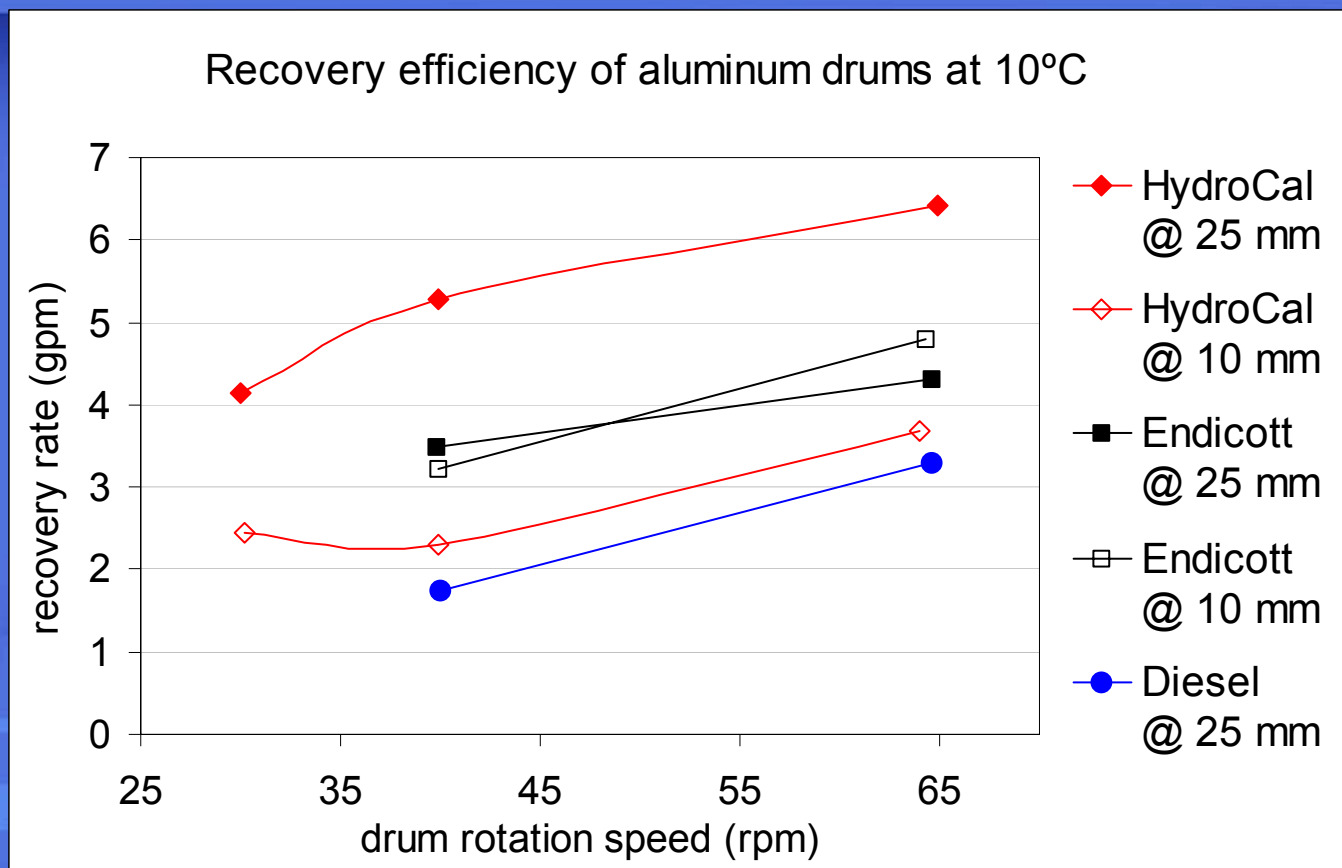


# Test results: oil type, slick thickness and drum pattern at 25°C

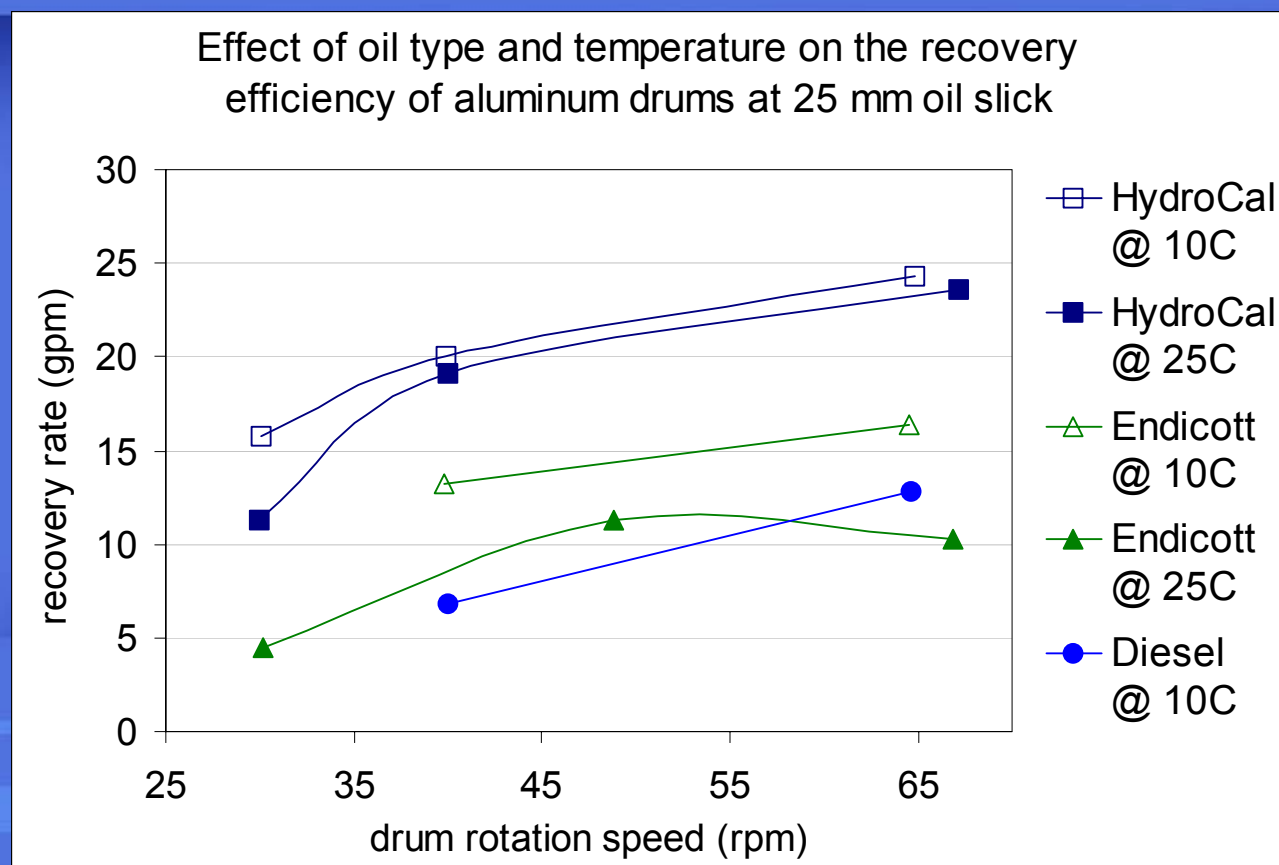
Recovery efficiency of aluminum drums



## *Test results: oil type and slick thickness at 10°C. Smooth drums.*



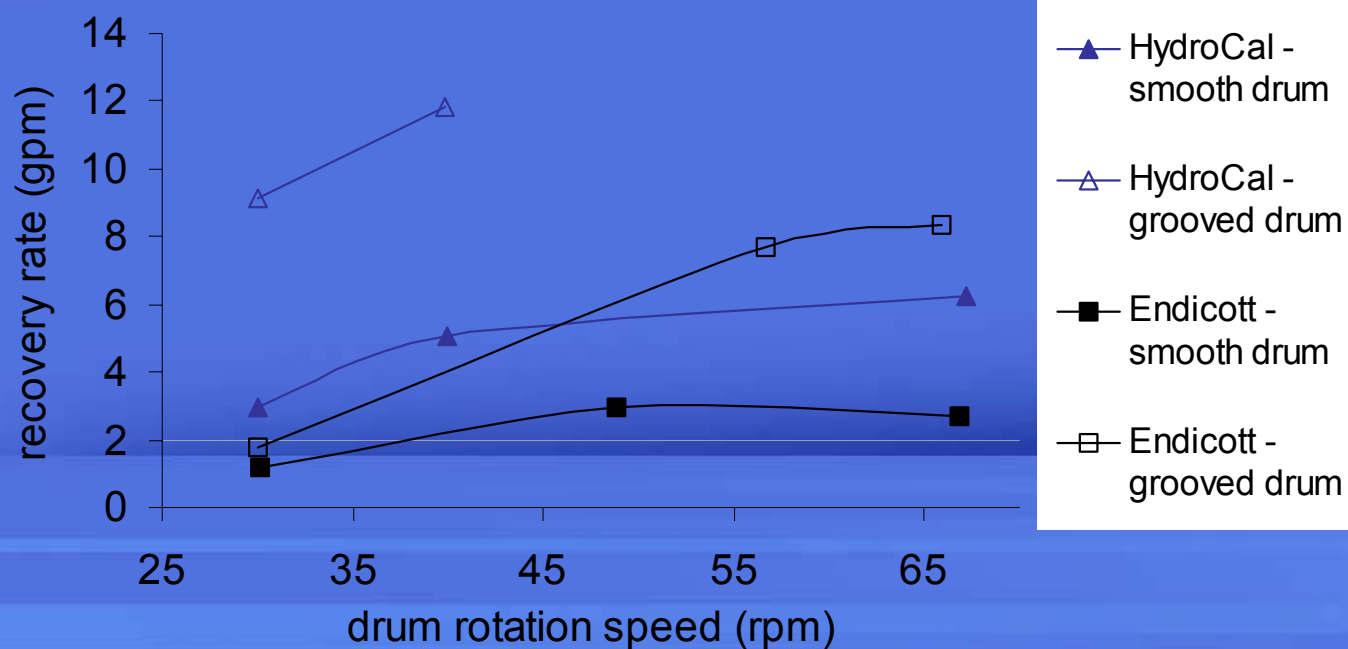
# Test results: oil type and temperature. Smooth drums.



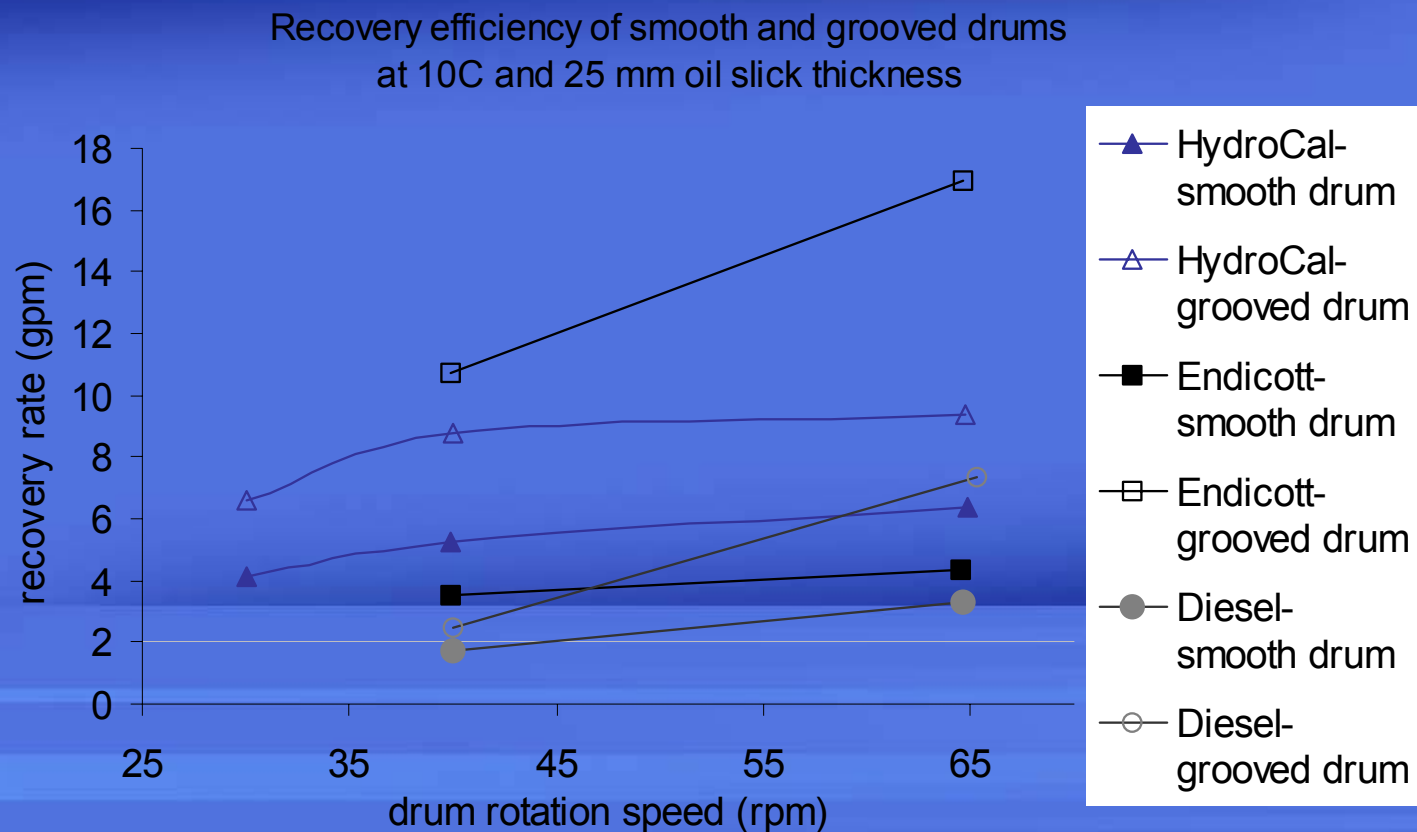


# Test results: oil type and drum pattern at 25°C

Recovery efficiency of smooth and grooved drums  
at 25°C and 25mm oil slick thickness

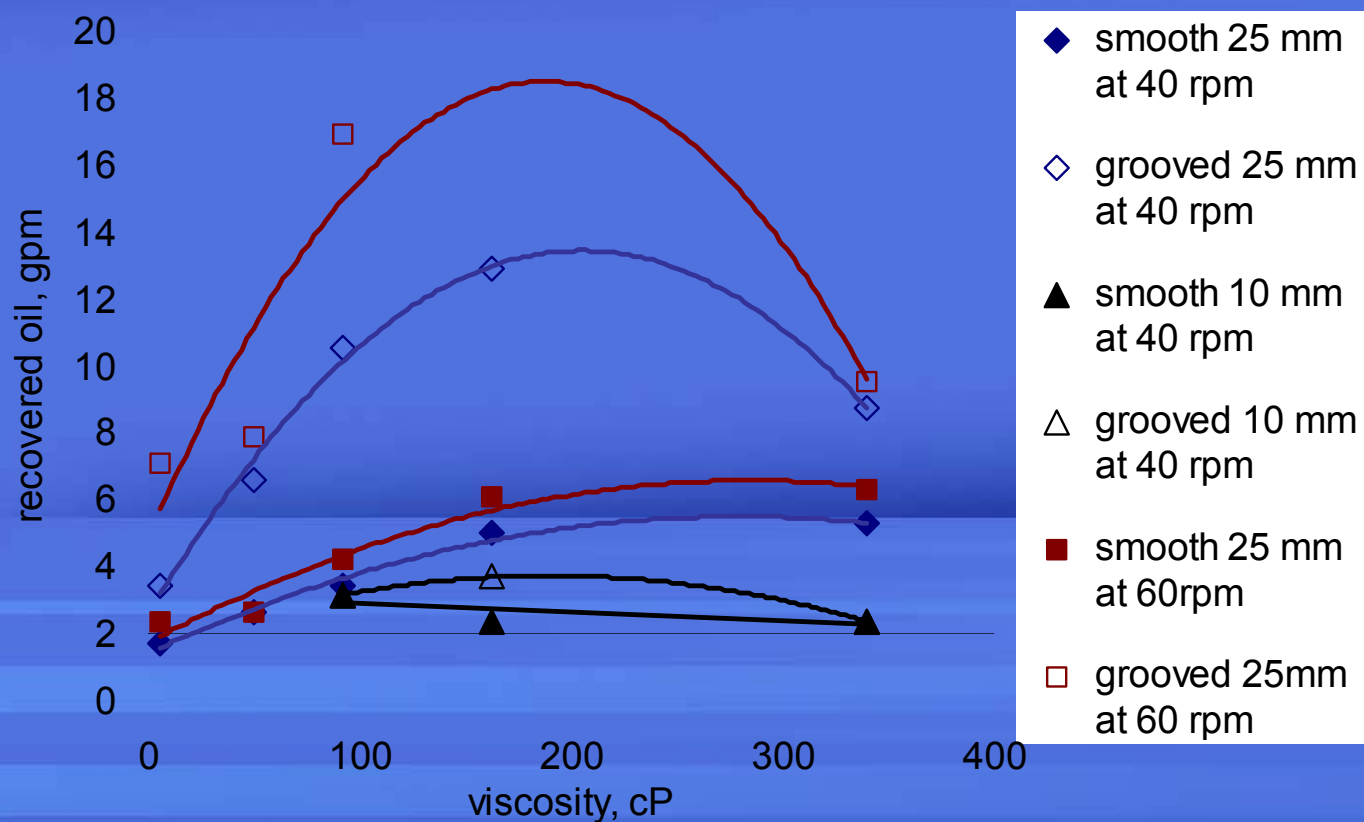


# Test results: oil type and drum pattern at 10°C



# Test results: oil viscosity and drum pattern

Effect of oil viscosity on the recovery efficiency



# *Conclusions*

- ④ Proposed grooved pattern can increase recovery efficiency by 100-200%.
- ④ Recovery surface material can increase recovery efficiency by 20%.
- ④ We determined the effect of oil viscosity, oil slick thickness, and drum rotation speed on the recovery efficiency.

# *Future work*

- ④ Tailoring recovery surface to oil viscosity.
- ④ Oil spill recovery in cold and ice-infested waters.
- ④ Graduation and new job!

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*Questions ?*











